



# DWR CCTAG Subgroup – Scenarios



July 17, 2012

# Today's Webinar

## California Water Plan 2013

### Climate Change Scenarios

- ❖ Summary of last CCTAG meeting discussion on climate scenarios
- ❖ Refined review of climate plots
- ❖ Proposal for drought scenario
- ❖ DWR's proposed set of climate scenarios for Update 2013

# Task Statement

**By May 2012, provide a high level assessment of the strengths and weaknesses of the 12 CAT climate scenarios and the 5 ensemble informed scenarios used by BDCP, and other existing and available projections or ensembles of projections for sampling the distribution of future climate projections.**

**By May 2012, provide recommendations for climate scenarios (selecting from existing and available projections or ensembles of projections) that are appropriate for representing a reasonable variation of future climate conditions for use in Update 2013 of the Water Plan.**

**Following the May 11 CCTAG full meeting, the subgroup could recommend a more detailed approach for assessment, selection, and technical approaches to future climate scenarios for water resources planning.**

## Policy Questions Related to Climate Scenarios

1. Do we want scenarios that span the distribution of potential future climates or do we want scenarios that sample the distribution of potential future climates?

The Water Plan prefers to span the distribution, meaning we are interested in capturing the range of plausible future climate scenarios.

2. How many scenarios do we want to evaluate?

The Water Plan prefers to use the fewest number of scenarios that captures a plausible range of future climate. The Water Plan has already run 13 climate scenarios, and could do a few more if necessary.

3. Do we want to use historical variability (inter-annual and inter-decadal) to represent the level of variability we expect to see in the future or do we want to use the GCMs to explore new examples of potential variability?

The Water Plan prefers to capture a plausible range of future climate variability, but recognizes there is value to using the historical variation as a benchmark.

4. Do we want to specifically target long-term supply declines or drought, or stick to what the historical and/or GCM selections give? (i.e., do we want a stress test?)

The Water Plan is interested in evaluating a drought scenario consistent with what has been experienced in the record.

5. Do we want to maintain spatial coherence and internal consistency within projections or do we want to maximize changes at each pixel to capture a wider range of potential outcomes.

The Water Plan prefers climate scenarios that maintain spatial coherence and internal consistency meaning we will use downscaled GCM output from individual GCMs for each climate scenario.

Model comparisons on Dashboard Share site:

## **CWP Scenarios Selection materials for 7-17-12 subgroup**

Four locations (Fresno, Millerton, Oroville, Red Bluff)

- 18 individual graphs of different climate scenarios with 30 year running average (historical, 5 CVP\_IRP, 12 CAT)
- 2 Box plot graphs, one for yearly precipitation another for the thirty year average precipitation
- 1 graph of the yearly cumulative precipitation over year

DRAFT Strengths/Weaknesses and Criteria for Climate Model Scenarios – 5/2/12

	12 Cat Scenarios	5 BDCP Scenarios
Strengths	<ul style="list-style-type: none"> <li>• Scenario selection based on GCMs using criteria developed by CAT</li> <li>• Thoroughly peer reviewed in published literature.</li> <li>• Used extensively in past statewide impact evaluations.</li> <li>• Preserves variability displayed in projections, doesn't rely on historical observations to incorporate inter-annual/inter-decadal variability.</li> <li>• Provides individual realizations of the future projection distribution.</li> </ul>	<ul style="list-style-type: none"> <li>• Captures wider range of possible climate from wet to dry and less warm and warm and central tendency</li> <li>• Includes 3 emissions scenarios</li> <li>• Includes information from all available projections</li> <li>• Provides a smaller set of scenarios to evaluate.</li> <li>• Multi-decadal variability bias and spatial inconsistencies of individual projections are buffered by aggregating several projections.</li> </ul>
Weaknesses	<ul style="list-style-type: none"> <li>• Bias toward drier side of projections</li> <li>• 30 year running averages appear to be flat for several of the scenarios. Is this reasonable?</li> <li>• Does not capture full range of uncertainty as described by the full CMIP3 archive of projections.</li> <li>• Has not been reevaluated since completion in 2008—new methods, research is available.</li> <li>• Does not provide a single central tendency or most likely outcome that can be used for detailed/project level decision making</li> <li>• Unsure if selection of models provides the appropriate sampling needed for given study.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not capture extremes unless mapped to a historical pattern</li> <li>• Computationally complex—requires considerable resources and expertise to modify in any way.</li> <li>• Scenarios are currently only available at two time periods 2025, 2060</li> <li>• Not thoroughly peer reviewed.</li> <li>• Collapses variability of multiple projections into ensemble average, potentially masking increases in future variability.</li> <li>• Difficult to maintain spatial continuity of the desired projection distribution realization that is run.</li> </ul>

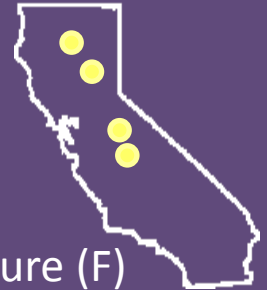
### Technical Criteria for Selecting Climate Scenarios

- Capturing precipitation variability is important
- Pick the best of the CAT and BDCP scenarios
- Visually observe 30 year running average precipitation
- Want to capture extremes, including extended dry periods
- Matching historical record is not a predictor of confidence of future projections
- Mimic historical variation
- Select scenarios that can be used for multiple planning purposes

# Climate Change Scenarios Subgroup

## Available Data for Scenario Comparison

**Data request:** Temperature and precipitation data for all methods to facilitate comparison of the range of changes represented by each method



Comparison sites: (N to S) Red Bluff, Oroville, Millerton, Fresno

Metrics: total annual precipitation (inches), average annual temperature (F)

### 12 CAT Scenarios

GCM output for 1950-2100  
(12 time series)

### 5 BDCP scenarios

- 88 year historical time series 1915-2003 adjusted with average changes for
  - 2025 (5 time series)
  - 2060 (5 time series)

### 5 CVP IRP scenarios Data Requested

88 year historical time series 1915-2003 adjusted with climate change that evolves over time  
(1915→2011...2003 →2099)  
(5 time series)

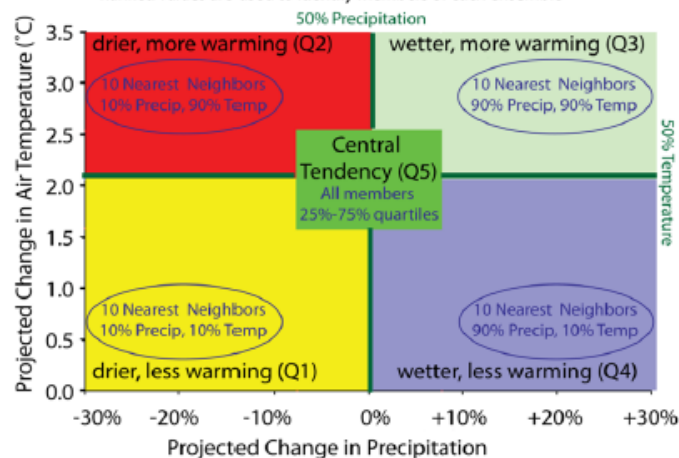
Data Available Now



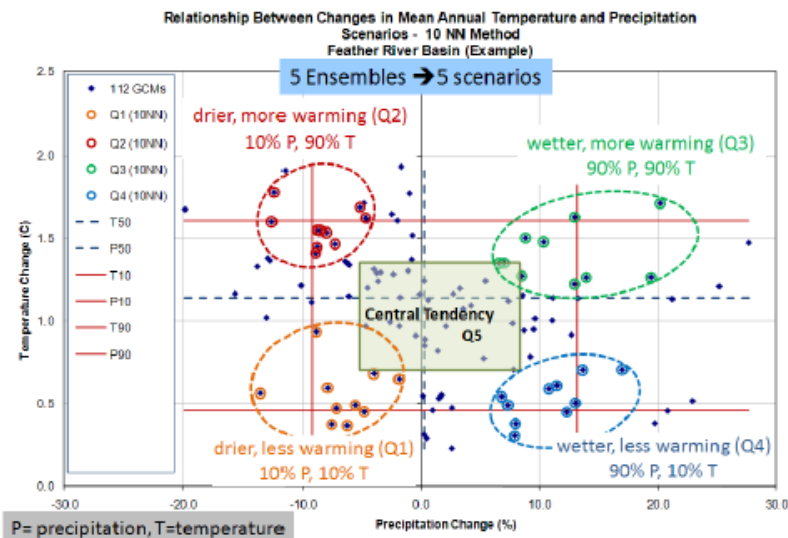
# BDCP Ensemble-Informed Climate Change Scenarios

Conceptual Mapping of 5 Scenarios:

Precipitation and temperature changes relative to historical conditions  
Ranked values are used to identify members of each ensemble



Example of selection of ensemble members for 5 scenarios:



# Discussion



**See you at**  
**Full CCTAG Meeting**  
**September 7, 2012**



# THANK YOU!

